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10/576,405	04/30/2007	Hideo Hada	SHIGA7.048APC	2382

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EXAMINER	
EOFF, ANCA	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
03/25/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
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Office Action Summary	Application No.	Applicant(s)	
	10/576,405	HADA ET AL.	
	Examiner	Art Unit	
	ANCA EOFF	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/11/2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/19/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 9-20 are pending in the application. Claims 1-8 have been cancelled.

2. The foreign priority documents JP 2003-363521 filed on October 23, 2003, JP 2003-410489 filed on December 9, 2003 and JP 2004-057448 filed on March 2, 2004 were received and acknowledged. However, in order to benefit of the earlier filing date, certified English translations are required.

Claim Rejections - 35 USC § 102 and 35 USC § 103

3. The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 19 and 20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Uetani et al. (US Pg-Pub 2001/0014428).

Claims 19 and 20 are product-by-process claims. Even though the claims are directed to a process, the patentability is given by the product itself.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe,* 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (MPEP 2113- Product-by-Process Claims)

With regard to claims 19 and 20, Uetani et al. disclose a resist pattern (par.0110) which anticipates or, in the alternative, renders obvious the resist pattern of the instant application. Applicant has not shown the process will render a different product than the product claimed.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 13-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uetani et al. (US Pg-Pub 2001/0014428) in view of Hatakeyama et al. (US Pg-Pub 2002/0207201) .

With regard to claim 9, Uetani et al. disclose a chemically amplified positive resist composition comprising a resin (X), which is insoluble or slightly soluble in alkali but becomes soluble in alkali due to the action of an acid and an acid generating agent (Y) (abstract).

A specific example of resin (X) is a copolymer of 2-methyl-2-adamantyl methacrylate/3,5-dihydroxy-1-adamantyl methacrylate/α-methacryloyloxy-γ-butyrolactone with Mw=7,100 (par.0098) , wherein;

- the 2-methyl-2-adamantyl unit is equivalent to the structural unit (a1) derived from a methacrylate ester comprising an acid dissociable group;

- the α-methacryloyloxy-γ-butyrolactone unit is equivalent to the structural unit (a2) derived from a methacrylate ester comprising a lactone-containing monocyclic group;

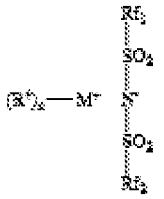
- the 3,5-dihydroxy-1-adamantyl methacrylate unit is equivalent to the structural unit (a3) derived from a methacrylate ester comprising a polar-group containing aliphatic hydrocarbon group.

Uetani et al. further disclose that the acid generator can be an onium compound (par.0030) but fail to include the sulfonium compounds of formula (b-1) of the instant application.

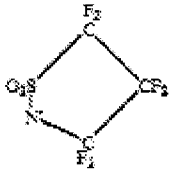
Hatakeyama et al. disclose a chemically amplified positive resist material comprising a base resin and an acid generator, wherein the resist material has high sensitivity and high resolution with respect to high-energy rays of 300 nm or less (abstract).

Hatakeyama further disclose that the base resin can be a polymer comprising units derived from (meth)acrylate ester comprising acid-dissociable groups and units derived from (meth)acrylate ester comprising lactone groups (see polymers 1-4 in par.0165).

The acid generator can be a compound represented by the formula (I):

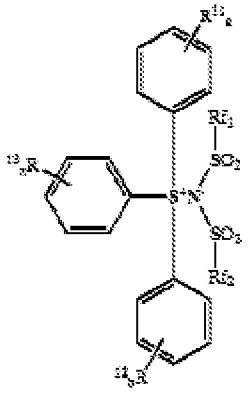


(I) (par.0022), wherein M^+ represents iodonium or sulfonium and R_{f1}, R_{f2} are straight-chained, branched or cyclic alkyl groups having 1 to 20 carbon atoms comprising at least one fluorine atom. R_{f1} and R_{f2} may be bonded together to form a ring (par.0024), as shown in the anion below:



(II) (formula (1)-26 in par.0025).

Hatakeyama et al. further disclose that the acid generator may be represented by the formula (III):



(III) (par.0030), wherein R^{11}, R^{12} and R^{13} may be hydrogen atoms or alkyl groups with 1 to 20 carbons (par.0031).

While Hatakeyama et al. does not specifically disclose sulfonium salts having a triarylsulfonium cation as in formula (II) and an anion of formula (II), it would have been obvious to one of ordinary skill in the art at the time of the invention to obtain such sulfonium salts, based on Hatakeyama's teachings that the onium salts may have an anion of formula (II) (par.0025) and a triaryl sulfonium cation, such as the one in formula (III) (par.0028-0030).

A triarylsufonium salt having the anion of formula (II) is equivalent to the compound (b-1) of the instant application.

The resist materials of Hatakeyama et al. have good sensitivity, resolution, line-edge roughness and I/G bias (par.0185).

As the photoacid generator of Hatakeyama et al. is successfully used for chemically amplified resist comprising resins such as methacrylate copolymers, it would have been obvious for one of ordinary skill in the art at the time of the invention to use the acid generator of formula (I) of Hatakeyama et al. in the chemically amplified positive resist composition of Uetani et al., with a reasonable expectation of success.

With regard to claim 10, Hatakeyama et al. further disclose that an acid generator, different from the one of described above can be added to the composition and indicates a series of compounds comprising as anion a fluoroalkylsulfonate, such as triphenylsulfonium trifluoromethanesulfonate (par.0090).

Triphenylsulfonium trifluoromethanesulfonate is equivalent to the onium-based acid generator having a straight chain fluorinated alkylsulfonate anion with 1 carbon atom of the instant application.

With regard to claim 11, Uetani et al. further disclose that the chemically amplified resist composition comprises a basic nitrogen-containing compound (par.0089).

With regard to claim 12, Uetani et al. further disclose a method of forming a pattern, comprising the following steps:

- applying the resist solution on a wafer by spin-coating (par.0106)

- pre-baking (par.0106);

- irradiating with an ArF excimer stepper through a line-and-space pattern (par.0107);

- subjecting the exposed wafer to post-exposure baking (par.0107);

- developing with an aqueous tetramethylammonium hydroxide solution, to obtain a developed pattern (par.0107).

7. Claims 13-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uetani et al. (US Pg-Pub 2001/0014428) in view of Hatakeyama et al. (US Pg-Pub 2002/0207201) and in further view of Uetani et al. (US Patent 6,348,297).

With regard to claims 13-16, Uetani et al. disclose a chemically amplified positive resist composition comprising a resin (X) which is insoluble or slightly soluble in alkali but becomes soluble in alkali due to the action of an acid and an acid generating agent (Y) (abstract).

A specific example of resin (X) is a copolymer of 2-methyl-2-adamantyl methacrylate/3,5-dihydroxy-1-adamantyl methacrylate/α-methacryloyloxy-γ-butyrolactone with Mw=7,100 (par.0098) , wherein;

- the 2-methyl-2-adamantyl unit is equivalent to the structural unit (a1) derived from a methacrylate ester comprising an acid dissociable group;

- the α-methacryloyloxy-γ-butyrolactone unit is equivalent to the structural unit (a2) derived from a methacrylate ester comprising a lactone-containing monocyclic group;

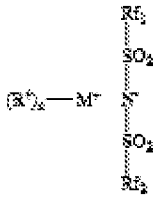
- the 3,5-dihydroxy-1-adamantyl methacrylate unit is equivalent to the structural unit (a3) derived from a methacrylate ester comprising a polar-group containing aliphatic hydrocarbon group.

Uetani et al. further disclose that the acid generator can be an onium compound (par.0030) but fail to include the sulfonium compounds of formula (b-1) of the instant application.

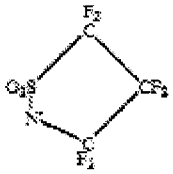
Hatakeyama et al. disclose a chemically amplified positive resist material comprising a base resin and an acid generator, wherein the resist material has high sensitivity and high resolution with respect to high-energy rays of 300 nm or less (abstract).

Hatakeyama et al. further disclose that the base resin can be a polymer comprising units derived from (meth)acrylate ester comprising acid-dissociable groups and units derived from (meth)acrylate ester comprising lactone groups (see polymers 1-4 in par.0165).

The acid generator can be a compound represented by the formula (I):

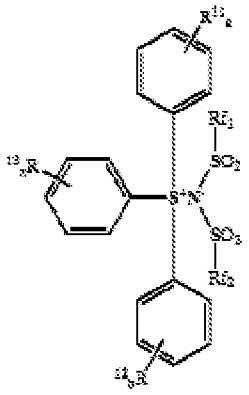


(I) (par.0022), wherein M^+ represents iodonium or sulfonium and R_{f1}, R_{f2} are straight-chained, branched or cyclic alkyl groups having 1 to 20 carbon atoms comprising at least one fluorine atom. R_{f1} and R_{f2} may be bonded together to form a ring (par.0024), as shown in the anion below:



(II) (formula (1)-26 in par.0025).

Hatakeyama et al. further disclose that the acid generator may be represented by the formula (III):



(III) (par.0030), wherein R^{11}, R^{12} and R^{13} may be hydrogen atoms or alkyl groups with 1 to 20 carbons (par.0031).

While Hatakeyama et al. does not specifically disclose sulfonium salts having a triarylsulfonium cation as in formula (III) and an anion of formula (II), it would have been obvious to one of ordinary skill in the art at the time of the invention to obtain such sulfonium salts, based on Hatakeyama's teachings that the onium salts may have an anion of formula (II) (par.0025) and a triaryl sulfonium cation, such as the one in formula (III) (par.0028-0030).

A triarylsufonium salt having the anion of formula (II) is equivalent to the compound (b-1) of the instant application.

The resist materials of Hatakeyama et al. have good sensitivity, resolution, line-edge roughness and I/G bias (par.0185).

As the photoacid generator of Hatakeyama et al. is successfully used for chemically amplified resist comprising resins such as methacrylate copolymers it would have been obvious for one of ordinary skill in the art at the time of the invention to use the acid generators of formula (I) of Hatakeyama et al. in the chemically amplified positive resist composition of Uetani et al., with a reasonable expectation of success.

Hatakeyama et al. further disclose that an acid generator, different from the one of described above can be added to the composition and indicates a series of compounds comprising as anion a fluoroalkylsulfonate , such as triphenylsulfonium trifluoromethanesulfonate (par.0090).

However, Uetani nor Hatakeyama discloses the amount of each acid generator used in combination.

Uetani et al. (US Patent 6,348, 297) disclose a chemical amplification type positive resist composition comprising a combination of acid generators, including a triarylsulfonium salt with a fluoroalkyl sulfonate anion (abstract).

Uetani et al. further disclose compositions comprising a mixture of acid generators, wherein the weigh ratio between the triarylsulfonium salt with a fluoroalkyl sulfonate anion and another onium salt is 1:2. The composition has excellent resolution and good transmittance (Example 5 in table 3, column 22, lines 32-33, wherein B2 and C1 are defined in column 20, lines 30-50)

The composition of Uetani et al. provides a good pattern profile under exposure using light of wavelength of 220 nm or shorter (abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to apply the teaching of Uetani et al. and use the an onium salt having a fluoroalkylsulfonate anion and the sulfonium salt of formula (VI) in a weight ratio of 1:2 in the composition of Uetani modified by Hatakeyama, with a reasonable expectation of success.

With regard to claim 17, Uetani et al. further disclose that the chemically amplified resist composition comprises a basic nitrogen-containing compound (par.0089).

With regard to claim 18, Uetani et al. further disclose a method of forming a pattern, comprising the following steps:

- applying the resist solution on a wafer by spin-coating (par.0106)

- pre-baking (par.0106);

- irradiating with an ArF excimer stepper through a line-and-space pattern (par.0107);

- subjecting the exposed wafer to post-exposure baking (par.0107);

- developing with an aqueous tetramethylammonium hydroxide solution, to obtain a developed pattern (par.0107).

Response to Arguments

8. The rejection of claims 13-18 and 20 under 35 USC 103(a) over Sato et al. (US Pg-Pub 2004/0259028) is withdrawn following the applicant's amendment to claim 13.

9. Applicant's arguments filed on December 11, 2008 with respect to the rejection of claims 9-12 and 19 over Sato et al. (US Pg-Pub 2003/0108809) in view of Hatakeyama et al. (US Pg-Pub 2002/0207201) have been fully considered and are persuasive.

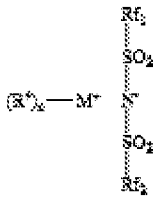
Therefore, the rejection has been withdrawn.

However, upon search and reconsideration, new grounds of rejection are shown in paragraphs 3-7 above.

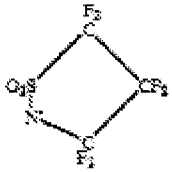
9. Applicant's arguments filed on December 11, 2008 with respect to the rejection of claims 13-18 under 35 USC 103(a) over Uetani et al. (US Pg-Pub 2001/0014428) in view of Hatakeyama et al. (US Pg-Pub 2002/0207201) and in further view of Uetani et al. (US Patent 6,348,297) have been fully considered but they are not persuasive.

On page 10 of the Remarks, the applicant argues that the Uetani references and Hatakeyama et al. do not disclose the acid generator (b-1) and the specific blend of the acid generator (b-1) with another onium-based acid generator.

The applicant agrees that Hatakeyama et al. do not specifically disclose the acid generator (b-1) of the instant application. However, Hatakeyama et al. disclose that the acid generator can be a compound represented by the formula (I):

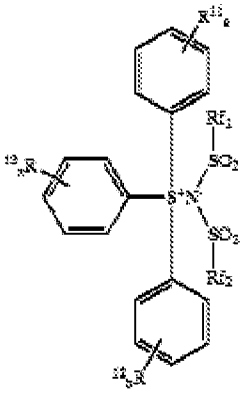


(I) (par.0022), wherein M^+ represents iodonium or sulfonium and R_{f1}, R_{f2} are straight-chained, branched or cyclic alkyl groups having 1 to 20 carbon atoms comprising at least one fluorine atom. R_{f1} and R_{f2} may be bonded together to form a ring (par.0024), as shown in the anion below:



(II) (formula (1)-26 in par.0025).

Hatakeyama et al. further disclose that the acid generator may be represented by the formula (III):



(III) (par.0030), wherein R^{11}, R^{12} and R^{13} may be hydrogen atoms or alkyl groups with 1 to 20 carbons (par.0031).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to obtain the acid generator (b-1) of the instant application, based on Hatakeyama's teachings that the onium salts may have an anion of formula (II) (par.0025) and a triaryl sulfonium cation, such as the one in formula (III) (par.0028-0030).

A triarylsufonium salt having the anion of formula (II) is equivalent to the compound (b-1) of the instant application.

The applicant further shows that Uetani et al. (US Patent 6,348,297) disclose a combination of acid generators with a specific blend ratio. However, the applicant argues that one of ordinary skill in the art would not have any reason to combine the blend ratio of Uetani et al. with the acid generators of Hatakeyama et al.

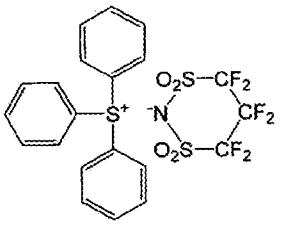
The examiner disagrees and would like to show that one of ordinary skill in the art would be motivated to combine the teachings of Uetani et al. and Hatakeyama et al., since they both teach blends of sulfonium acid generators.

The examiner relied on Uetani et al. to show that using a combination of acid generators is well-known in the art and one of ordinary skill in the art would have the motivation to combine acid generators, with a reasonable expectation of success.

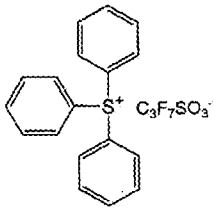
On page 10 of the Remarks, the applicant argues that the claimed invention provides significant unexpected results. On page 8 of the Remarks, the applicant argues that the Examples 1 and 2 which use resins having a molecular weight of not more than 7,500 result in a broad DOF (depth of focus) while Comparative Example 1 which uses a resin having a molecular weight of 9,500 results in a narrower DOF. Also LER (line edge roughness) and the developing defects are reduced in Examples 1 and 2, in comparison to Comparative Example 1.

The examiner would like to point out that the primary reference Uetani et al. uses a resin with a molecular weight of 7,100 (see par.0098), which meets the limitation of the claim for the molecular weight of the resin.

The examiner would also like to point out the following: the Examples of the instant application use only the acid generators PAG-1 and PAG-2, as shown bellow:



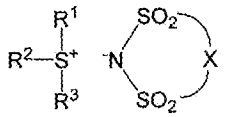
(PAG-1) and



(PAG-2).

However, claim 13 claims :

- an acid generator (b-1) of formula:



, wherein X is an alkylene group of 2 to 6 carbons in which at least one hydrogen atom has been substituted with a fluorine atom, R^1 to R^3 each represents, independently, an aryl group or an alkyl group, and at least one of R^1 to R^3 represent an aryl group, and

- an onium-salt based acid generator comprising a straight chain fluorinated alkylsulfonate anion of 1 to 7 carbon atoms.

As the applicant does not specifically define the terms “alkyl” and "aryl" for the compound (b-1), the claimed compound (b-1) can be represented by a large variety of compounds. Also, the " onium-salt based acid generator comprising a straight chain fluorinated alkylsulfonate anion of 1 to 7 carbon atoms” can be represented by a large variety of compounds, such as alkylsulfonium salts, aromatic sulfonium salts, alkyliodonium salts, aromatic iodonium salts, etc.

Therefore, the Examples of the instant application are not commensurate to the scope of the claims and are insufficient to prove unexpected results for the claimed invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANCA EOFF whose telephone number is (571)272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. E./
Examiner, Art Unit 1795

/Cynthia H Kelly/
Supervisory Patent Examiner, Art Unit 1795